भारतीय मानक
Indian Standard

IS 8598 : 2019

बेल्ट कन्वेयर के लिए आइडलर एवं आइडलर सेट — विशिष्टि

(दूसरा पुनरीक्षण)

Idler and Idler Sets for Belt Conveyor — Specification

(Second Revision)

ICS 53.040.01

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October 2019 **Price Group 6**

Continuous Bulk Conveying, Elevating, Hoisting, Aerial Ropeways and Related Equipment Sectional Committee, MED 06

FOREWORD

This Indian Standard (Second Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Continuous Bulk Conveying, Elevating, Hoisting, Aerial Ropeways and Related Equipment Sectional Committee, had been approved by the Mechanical Engineering Divisional Council.

This standard was originally published in 1977 and subsequently revised in 1987. The second revision of this standard incorporates the experience gained with use of this specification and brings the standard inline with the latest developments in the field of idler rollers and idler sets.

The major changes in this revision are as follows:

a) Standard has been modified to include conveyors operating at a maximum speed of 5 m/s;
b) Classification of idlers has been included;
c) Figures have been modified;
d) Values in table have been modified;
e) Scopehas been modified based on the present design practices/norms;
f) Terminology, revised details are incorporated;
g) Requirements for thickness of lining for idlers have been incorporated;
h) Dimension details have been included in table and figures;
j) Detailed requirements have been included;
k) Run out norms for idlers have been included; and
m) Standard has been modified to include conveyors operating at a maximum speed of 5 m/s and belt width up to 2 400 mm.

For the purpose of deciding whether a particular requirement of this code is complied with the final value, observed or calculated, expressing the results of a test or analysis shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

IDLER AND IDLER SETS FOR BELT CONVEYOR — SPECIFICATION

(Second Revision)

1 SCOPE

1.1 This Indian Standard covers the requirement of carrying idlers with their arrangement of three rollers and return idlers with one roller to two rollers for troughed belt conveyors operating at a speed up to 5 m/s and belt width up to 2 400 mm. Beyond 2 400 mm and 5 m/s belt speed, specification of idlers shall be as agreed between the purchaser and the manufacturer.

1.2 It does not cover idlers and idler sets for portable conveyors, mobile conveyors and rolling conveyors and garland, catenary and impact idlers, pipe conveyor, horizontal curved conveyors.

2 REFERENCE

The Indian Standards as listed in Annex A contain provisions which, through reference in the text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the Standards.

3 TERMINOLOGY

For the purpose this standard, the terminology given in IS 4240 shall apply, in addition to the following.

3.1 Roller — Rotating parts of idlers, which support the belt.

3.2 Frame — Structural parts in which, rollers are mounted.

3.3 Troughing Angle (λ) — Angle of the axis of side rollers of idlers from the horizontal.

3.4 IdlerVertical Clearance (m) — The vertical clearance of the bottom periphery of central roller and the top of the transom or any structural frame, nearest to roller.

4 CLASSIFICATIONOF IDLERS

4.1 Idlers for troughed belt conveyors are of the following types:

a) Carrying idlers inline, of equal rollers length, supporting the carrying belt;
b) Carrying idlers inline, of unequal rollers length, supporting the carrying belt;
b) Carrying idlers of staggered, of equal rollers length, supporting carrying belt;
c) Carrying idlers staggered, of unequal rollers length, supporting the carrying belt;
d) Return idlers of one roller, supporting return belt;
e) Return idlers of two rollers, supporting return belt; and
f) Transition idlers supporting the carrying belt placed in transition zone.

4.2 *See* IS 11592 for selection of idler rollers and classification of duty.

5 DIMENSION

5.1 Idler Roller Outer Diameter (d1)

The outer diameter of carrying and return roller as shown in Fig. 1 shall be selected from Table 1.

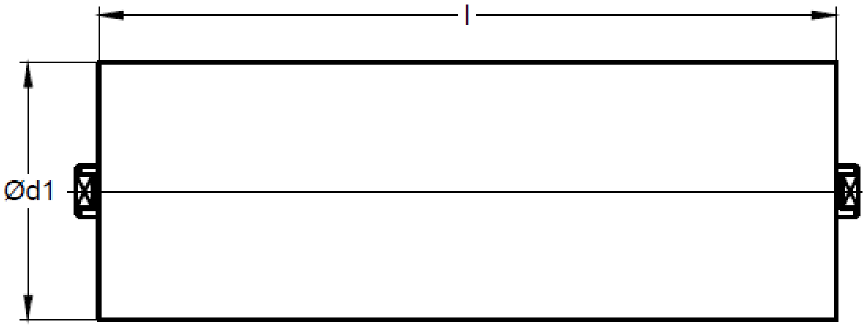


FIG. 1 TYPICAL IDLER ROLLER

5.2 LengthsRollers of Idlers

Figures 2, 3 and 4 shows rollers for one piece, two piece and three piece idlers respectively. Table 2 shows the length of rollers for carrying/return idlers of troughed belt conveyor.

Table 1 Carrying and Return Roller of Idlers

(*Clause* 5.1)

Diameters in mm

Light Duty						Medium Duty			Heavy Duty				
63.5	76.1	88.9	101.6	108	114.3	127	133	139.7	152.4	159	168.3	193.7	219.1

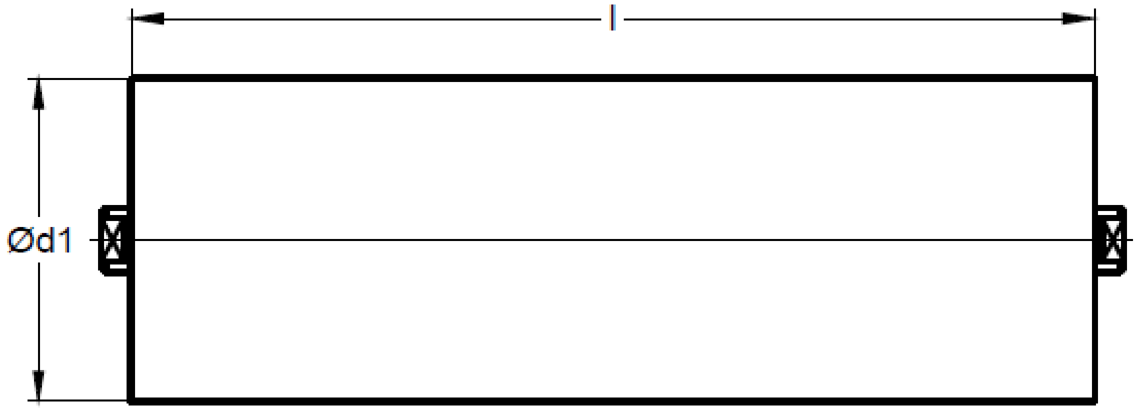


FIG. 2 ONE PIECE IDLER

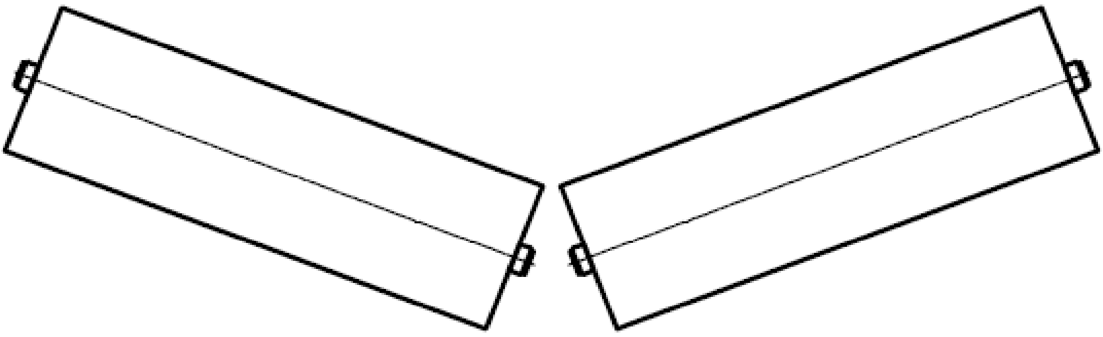


FIG. 3 TWO PIECE IDLER

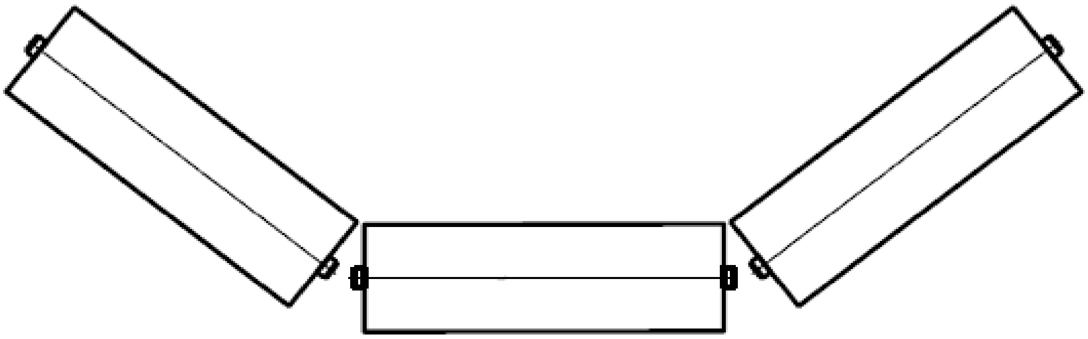


FIG. 4 THREE PIECE IDLER

Table 2 Length of Rollers for Carrying/Return Idlers of Troughed Belt Conveyor

(*Clause* 5.2)

Belt width b-*mm*	**Return Roller length (l) in mm**		
	One Piece	Two Piece	Three Piece
400	500	250	160
500	600	315	200
650	750	380	250
800	950	465	315
1000	1150	600	380
1200	1400	700	465
1400	1600	800	530
1600	1800	900	600
1800	2000	1000	670
2000	2200	1100	750
2200	2500	1250	800
2400	2800	1400	900

Roller lengths for unequal rollers shall be as agreed between the purchaser and the manufacturer.

5.3 Carrying/Return Idler

Mounting dimension shall be as shown in Fig. 5 and Fig. 6 and, as per Table 3.

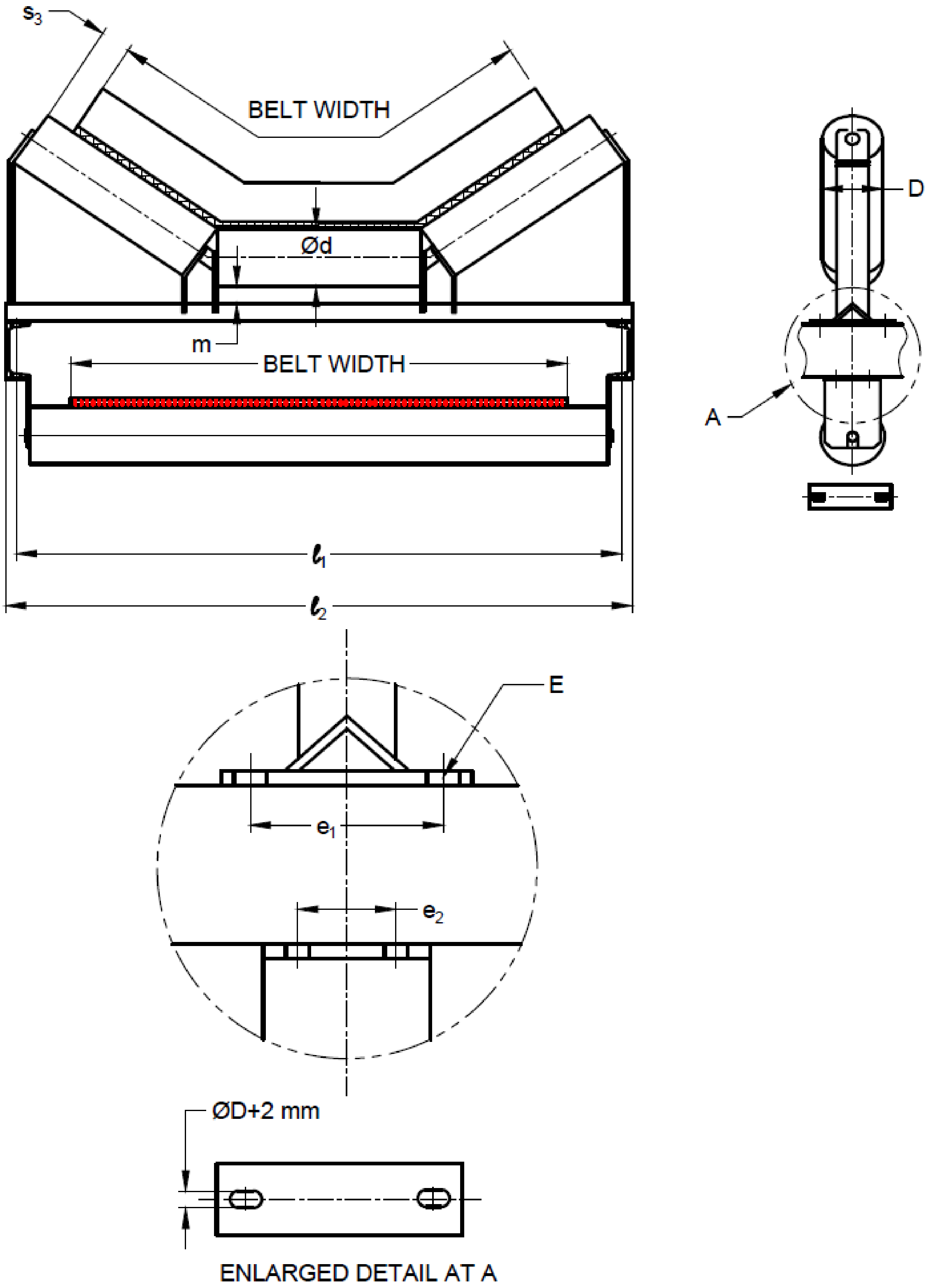


Fig. 5 Carrying and One Piece Return Idler

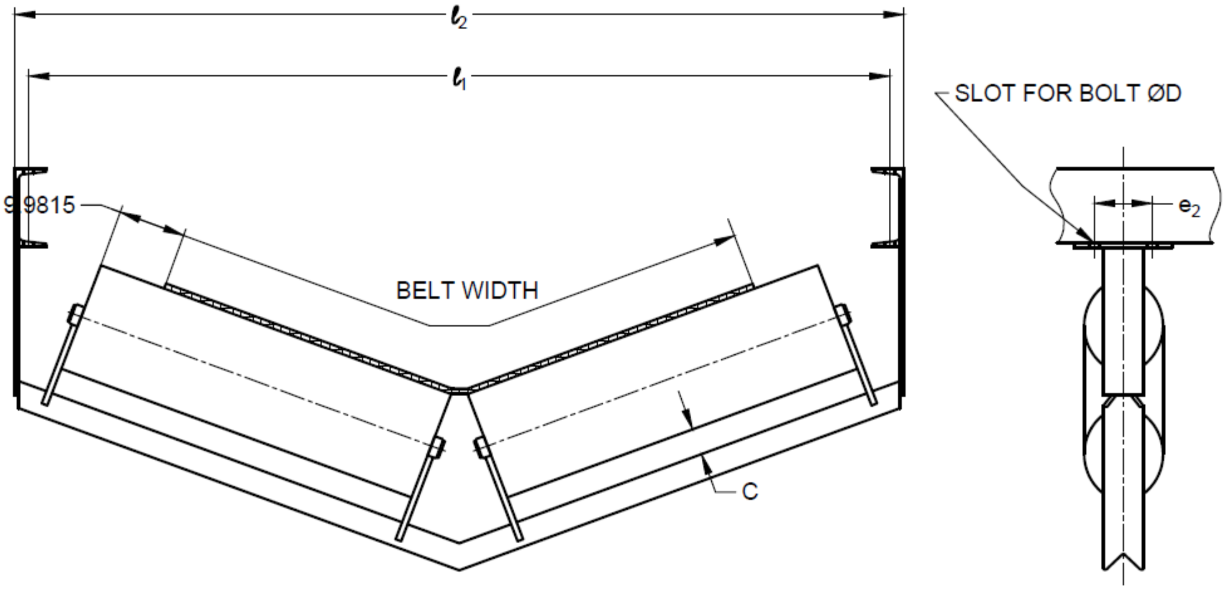


FIG. 6 TWO PIECE RETURN IDLER

Table 3 Mounting Dimensions

(*Clause* 5.3)

Belt Width 'B'mm	l_1	l_2	e_1 (*Min*)	e2		D (*Min*)	s_1	s_2	s_3
				One Piece Return Idler	Two Piece Return Idler				
400	690	755	200	65	100	M12	50	40	35
500	790	855	200	65	100	M12	50	40	40
650	940	1000	200	65	100	M12	50	55	50
800	1 090	1150	200	65	100	M12	75	65	70
1 000	1 290	1350	200	65	100	M12	75	75	70
1 200	1 490	1555	200	65	100	M16	100	100	95
1 400	1 690	1755	200	65	100	M16	100	100	95
1 600	1 900	1965	200	65	100	M16	100	100	95
1 800	2 100	2165	200	65	100	M20	100	100	100
2 000	2 300	2365	250	65	100	M20	100	100	100
2 200	2 550	2615	250	100	100	M20	150	150	100
2 400	2 850	2815	250	100	100	M20	200	200	150

5.3.1 *Slots for Mounting Bolts (SL)*

Slots for mounting bolts of diameter D, shall be width D+2 mm, *Min*. and 25 mm, *Min*. long in the longitudinal direction along the direction of conveyor (*see* Fig. 5 and Fig. 6).

5.3.2 *Clearance Dimension Requirement (m)*

The clearance requirement beneath center roller and both side of carrying rollers (*see* Fig. 5) shall be as given in Table 4.

Table 4 Clearance Dimensions

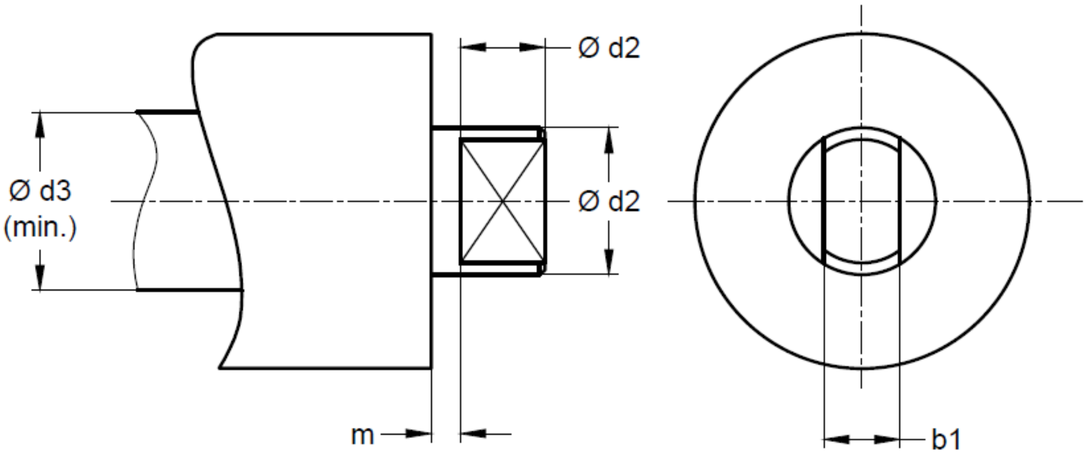
(*Clause* 5.3.2)

Diameter of roller for Carrying idler ‘d1’ (mm)	≤ 127	127 < d1 ≤ 168.3	≤ 193.7	≤ 219.1
Minimum clearance ‘m’ (mm)	30	40	50	60

The clearance height for 1 piece return roller shall be as agreed between the purchaser and the manufacturer.

5.4 Spindle Ends

5.4.1 *Type A Spindle Without Added End Cap (see Fig. 7)*



All dimensions in millimeters

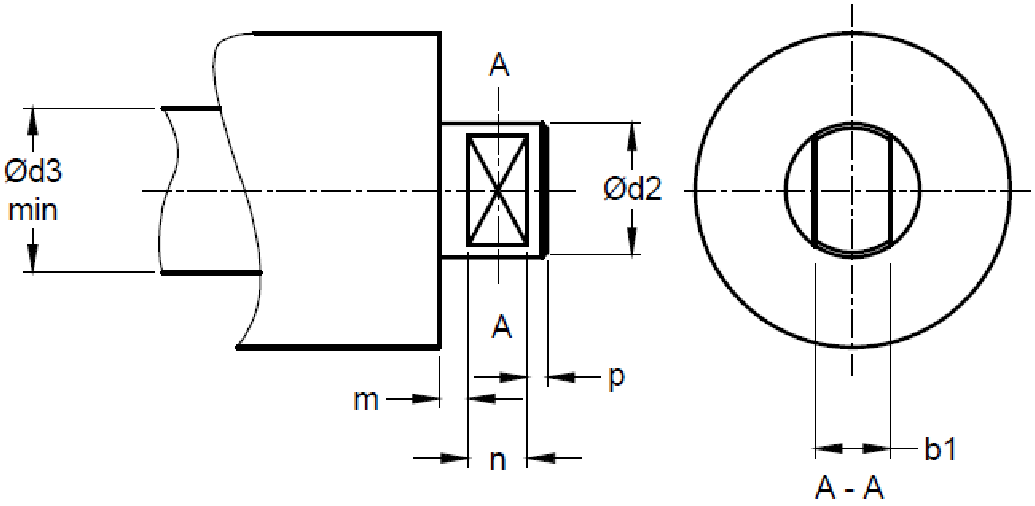
FIG. 7 TYPE A SPINDLE WITHOUT ADDED END CAP

Table 5 Dimension of Type A Spindle without Added End Cap

(*Clause* 5.4.1)

d2	**d3 (Min.)**	**b1**	**m**	**n***
20	20	14	4	9
25	25	18	4	9
30	30	22	4	9
35	35	28	4	9
40	40	32	4	9
45	45	38	4	9
*For return idler n+10 is permissible.				

5.4.2 *Type B Spindle Without Added End Cap (see Fig. 8)*



All dimensions in millimeters

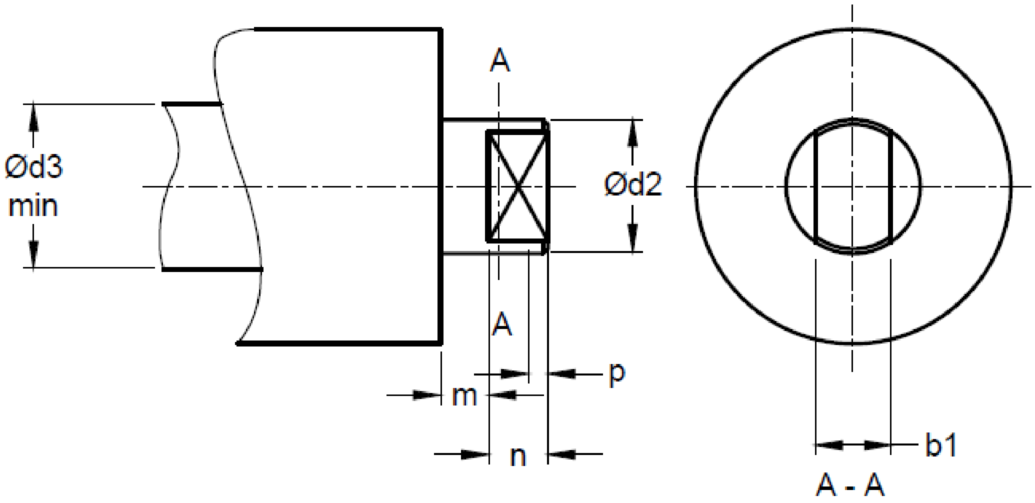
FIG. 8 TYPE B SPINDLE WITHOUT ADDED END CAP

Table 6 Dimension of Type B Spindle without Added End Cap

(*Clause* 5.4.2)

d2	d3	b1	m	n	p
20	20	14	4	9	5
25	25	18	4	9	5
30	30	22	4	9	5
35	35	28	4	9	5
40	40	32	4	9	5
45	45	38	4	9	5

5.4.3 *Type C Spindle End With Added End Cap (see Fig. 9)*



All dimensions in millimeters

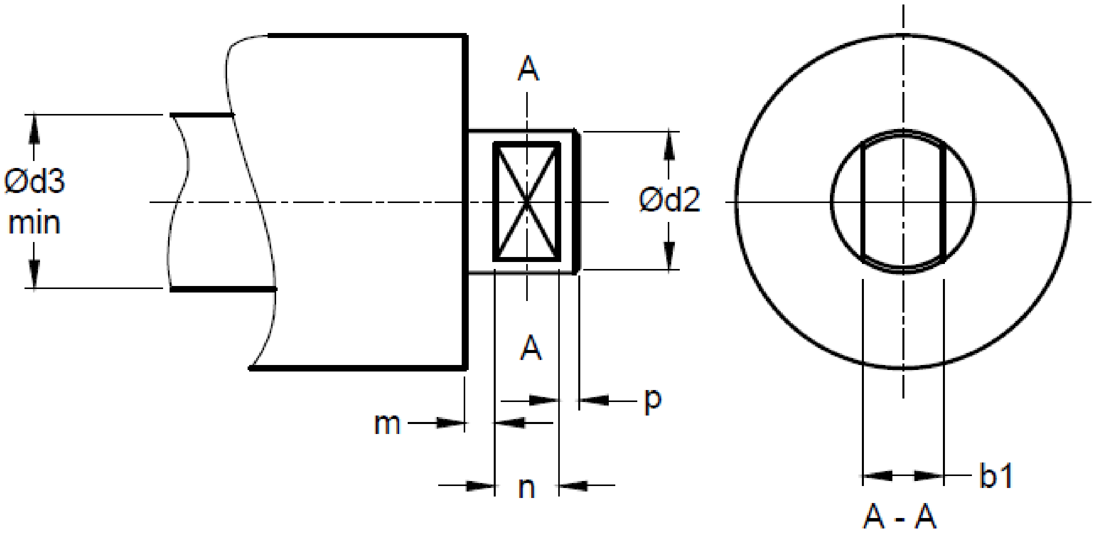
FIG. 9 TYPE C SPINDLE END WITH ADDED END CAP

Table 7 Dimension of Type C Spindle End with Added End Cap

(*Clause* 5.4.3)

d2	d3	b1	m	n
35	20	28	4	10
40	25	32	4	12
45	30	38	4	12

5.4.4 *Type D Spindle Endwith Added End Cap (see Fig. 10)*



All dimensions in millimeters

FIG. 10 TYPE D SPINDLE END WITH ADDED END CAP

Table 8 Dimension of Type D Spindle End with Added End Cap

(*Clause* 5.4.4)

d2	d3	b1	m	n	p
35	20	28	4	9	5
40	25	32	4	9	5
45	30	38	4	9	5

5.4.5 Idlers with one shot lubrication, may have special shaft ends suitable for the purpose.

5.4.6 Impact idlers and troughing training idlers rollers shall have spindle ends similar to those of troughing idlers rollers and shall conform to **5.4.1** to **5.4.4**. The return training idlers rollers shall have ends similar to return idlers rollers.

6 REQUIREMENTS

6.1 Troughing Angle (λ)

The value of troughing angle shall be selected from those given below for all standard widths of belt conveyor

10°	15°	20°	25°	30°	35°	40°	45°

NOTE — The designer shall satisfy himself that belt construction shall trough adequately on troughing idlers

6.2 Troughing Angle of Return Idlers

6.2.1 *Two Piece Return Idlers*

The value of troughing angle of rollers of return idlers shall be selected from the 10°, 15°and20°.

6.2.2 Training idler need not be considered in return side where, two piece return idler are used.

6.3 Angle of Tilt (ψ) of Side Rollers of Idlers

Shall be chosen as function of troughing angle (λ) and belt speed, and shall be as small as practicable and in any case shall not be more than 3° (*see* Fig. 11). The angle of tilt(ψ) of side rollers of idlers shall be indirection of belt run for the unidirectional conveyors and it shall be zero degree for reversible conveyors.

6.3.1 It is not obligatory to provide angle of tilt (ψ) unless specifically desired by the purchaser. Angle of tilt on side rollers of idlers may be eliminated by using training idlers or side guide rollers.Side rollers, if used with training idlers are to be placed before the carrying roller when looking from tail pulley side towards belt direction.

NOTE — When providing both angle of tilt and training idlers in same conveyor it shall be as agreed between purchaser and manufacturer.

6.4 Arrangement of In-Line and Staggered Carrying Rollers of Idlers

6.4.1 Troughing carrying idler sets built up from three rollers may be arranged with rollers in-line or staggered as shown in the plan view in Fig. 12.

6.4.1.1 When staggered, the displacement of the axis of the center roller from the adjacent axis of the side rollers shall not be less than the diameter of rollers.

6.4.2 Staggered carrying 3 roller sets shall be arranged with adjacent ends of side rollers and center roller overlapping by minimum of 10 mm when measured as indicated in Fig. 13. For 3 roll in staggered transition.

6.4.3 The gap between the adjacent ends of the center and side rollers of an in-line 3-roll set shall not be greater than 10mm when measured as indicated in Fig. 13. For 3-roll in-line transition idlers, the gap between rollers can be increased as agreed between the purchaser and the manufacturer.

6.4.3.1 Whenever it is not feasible to achieve this gap of 10 mm due to end details of idlers and the lower troughing angle start from 5 degree, in such case, roller diameter up to and including 219.1 mm, the permissible gap between rolls may be increased to 23 mm.

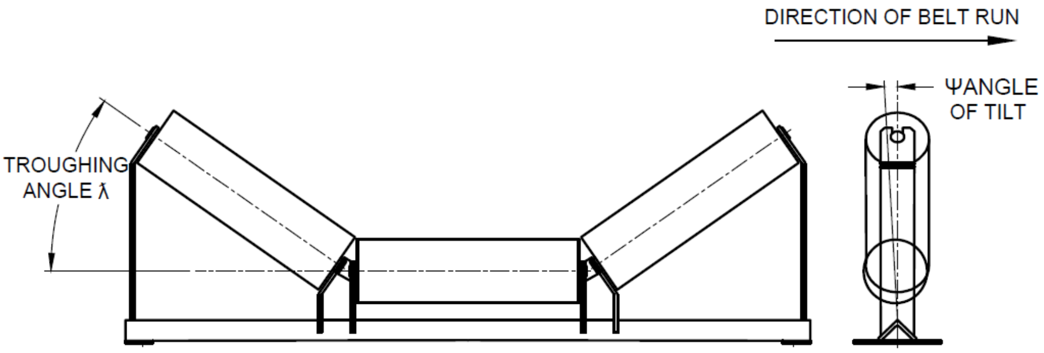


Fig. 11 Angle of Tilt (Ψ) of Side Rollers of Idlers

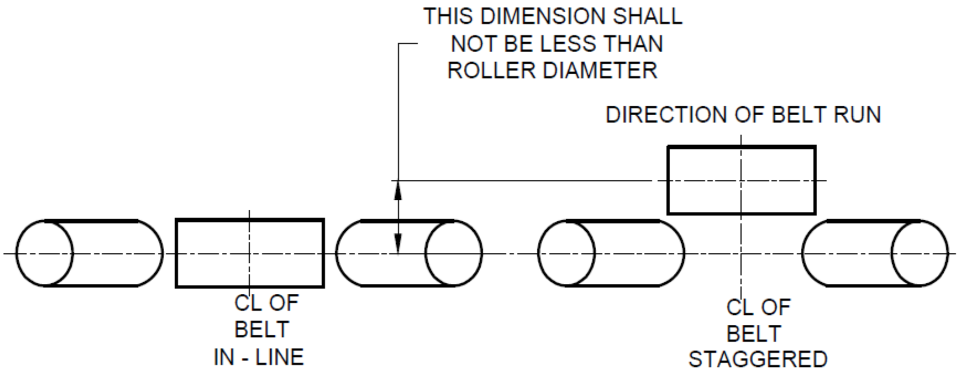


Fig.12 Arrangement of In-Line and Staggered Carrying Rollers of Idlers

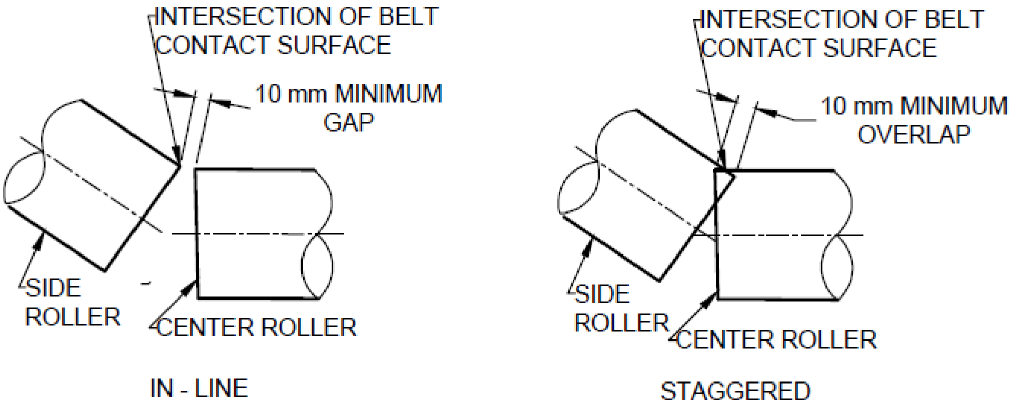


FIG. 13 STAGGERED CARRYING THREE ROLLER SETS

6.5 Run-out

The idler roller diameter, measured by a dial test indicator at any point along its length when rotated on its own bearing shall not exceed the total indicator reading in respect to belt speed as indicated in Table 9.

Table 9 Run Out

(*Clause* 6.5)

Belt Speed-v (m/sec) → **Roller length-L (mm)** ↓	**≤ 3**	**3 > v ≤ 4**	**4 > v ≤ 5**
	Run out in mm		
≥ 750	1.4	1.0	0.8
750 > l ≤ 1200	1.6	1.2	1.0
>1200	1.8	1.4	1.2

6.6 Modalities of inspection of idlers at manufacturer’s works shall be mutually agreed between purchaser and manufacturer. However, the following tests are recommended:

a) Visual tests measuring length, diameter, out of roundness and spindle arrangement;

b) Water and dust ingression tests; and

c) Rolling friction coefficient tests.

6.7 Idler Bearing

Unless the purchaser specifies a longer minimum rated life, the minimum design rated life for the idler bearings shall be 25000 h for bearings lubricated for life time as well as intermittently lubricated bearings. Seize-resistant ball bearing for idlers shall be preferable (if available).

6.8 Steel tubes used in manufacture of idlers rollers and idler sets shall conform to IS 9295.

6.9 Test process of construction, specific materials and other requirements in view of the application, environmental and meteorological condition of use of the idlers/idlers set shall be as agreed to between the manufacturer and the purchaser.

7 DESIGNATION OF IDLER SET — SHAPE OF IDLERS

7.1 Designation of Idler Roller

An idler roller diameter (d1) of 133 mm and roll length (l) of 1000 mm, with spindle type A with (d2) of 25mm shall be designated as ‘Idler roller 133 × 1000 A × 25 IS 8598’.

7.2Designation of Idler Set

An carrying idler set of 3 piece design, 35 degree troughing angle, diameter d1 of 133 mm, for 1000 mm belt width with spindle end of type A with d2 of 20 mm shall be designated as ‘Idler 133 × 3P × 35 × 1 000 BW × A × 20 IS 8598’.

NOTE — Foridler roller or idler set having special specifications than details descriptions shall be followed.

8 MARKING REQUIREMENTS

8.1 The idlers shall be marked with the following:

a) Roller diameter x, roller length x, spindle diameter at bearing;

b) Drawing number;

c) Manufacturer’s name; and

d) Quarter and year of manufacturing.

8.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act,* 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
4240 : 1984	Glossary of conveyor terms and definitions
11592 : 2000	Selection and design of belt conveyors — Code of practice
9295 : 1983	Specification for steel tubes for idlers for troughed belt conveyors

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of ‘BIS Catalogue’ and ‘Standards: Monthly Additions’.

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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